Dr. Blaxall's Report to the Local Government Board on the Sanitary Condition of Plymouth.

George Buchanan,
Assistant Medical Officer,
11th February 1879.

The inquiry which has been the occasion of the present report was made by direction of the Local Government Board, in compliance with a memorial numerously signed by the inhabitants of Plymouth petitioning for an inquiry into the sanitary condition of their town. This, I may state, has on many previous occasions and on different accounts attracted the attention of the Government. In 1853 a comprehensive inquiry into the general sanitary circumstances of the town was made by Mr. Rawlinson, C.B., for the General Board of Health, and since the constitution of the Local Government Board inquiries have been held by Dr. (now Sir Anthony) Home in 1872 with reference to an epidemic of diphtheria; by Mr. Harrison, C.E., in 1873, into certain drainage nuisances; and by myself, in January of the present year, into the particulars of an epidemic of diphtheria.

General description.

Plymouth is a municipal and parliamentary borough and seaport town, beautifully situated in the south-west extremity of the county of Devon, and forming, with the neighbouring towns of Stonehouse and Devonport, one of the most important naval and military arsenals of the kingdom. It carries on a considerable foreign and coasting trade, and is the chief emigration depôt for the Australian and New Zealand colonies. The municipal borough is coterminous with the registration district, and is bounded on the north by the registration districts of Stoke Damerel and Plympton; on the south by the magnificent harbour of the Sound, stretching into the English Channel; on the east by the Laira (an estuary of the river Plym) and the Catwater Channel; and on the west by the registration district of Stonehouse, and by Mill Bay, an arm of the Sound. Between Mill Bay and the Catwater is the inlet of Sutton Pool, which is the old commercial harbour, and now forms the chief seat of the coasting trade, while for the convenience of foreign trade extensive docks have been constructed at Mill Bay, and are the property of the Great Western Railway Company.

The registration district of Plymouth contains the sub-districts of St. Andrew's and Charles, covering in all an area of 1,510 acres, of which 850 are built over, 45 consist of water, and the remaining 615 acres of unoccupied land situated principally in the Charles district on the eastern side of the area. The town (not to speak of outlying parts of the district situated on a variety of levels) stands partly on two hills, north and south, and partly in the intervening valley. The north hill rises to a height of about 200 feet above sea level, but the south hill attains an elevation of only 100 feet, its summit terminating in the Hoe, a fine esplanade, extending from Mill Bay to Sutton Pool, and commanding an extensive view of the Sound, with the wooded slopes of Mount Edgcumbe on the right of the harbour and Staddon heights on the left, while in front the harbour is protected from the force of the channel by the breakwater, a stupendous structure of about one mile in extent.

The oldest portions of the town, comprising the neighbourhood of Sutton Pool and extending to about the centre of the valley, consist of numerous confined courts and alleys, and narrow, irregular, and occasionally steep streets, in which the houses stand closely packed together. But in the more modern parts the streets are fairly broad and open, and are laid out in parallel lines intersecting each other at right angles, thus forming blocks or squares. The principal shops occupy the main thoroughfares of Bedford Street, George Street, and Union Street, the latter extending in a direct line to Stonehouse.

Geology.

Geologically the district consists principally of the Devonian formation, but the southern portion of it is crossed by a belt of limestone.

The population is of an increasing character. In 1871 it was enumerated at 68,833, and is now estimated by the Registrar General at 73,599; while as regards density of population, Plymouth ranks third highest on the Registrar General's list of large

English towns. The industries, exclusive of those immediately connected with the mercantile and shipping interests, consist of extensive fisheries, manure and chemical works, sugar refineries, distilleries, and other important manufactories.

In proceeding to give the results of my recent inspection, which has extended to all parts of the registration district, I propose to treat first of the several sanitary conditions that came under observation; secondly, of the health of the town during recent years. Here I may state that in conducting this inquiry I have been deprived of the advantage of the assistance of Dr. Littleton, the Medical Officer of Health, who, I regret to state, was suffering from the effects of an attack of typhoid fever contracted in the execution of his duties, and was obliged to leave Plymouth for the benefit of his health.*

Sanitary Conditions.

Sewerage.

It is beyond the scope of this report to attempt a minute description of the several miles of *sewers and drains* that enter into the drainage system of Plymouth; suffice it to state generally that they offer great variety as regards material, size, shape, and construction. For drainage purposes the town may conveniently be considered under the head of four distinct drainage districts, north, south, east, west, each being provided with a main sewer having a separate outfall.

Besides these four drainage systems there are in various localities old sewers supposed to be disused, but sewage may still be seen escaping from them. Moreover the outlets, three or four of which empty into Sutton Pool, are complained of as creating great nuisance. The sewer which runs through a locality known as Friary Green, calls for special mention. Formerly this sewer emptied direct into Sutton Pool, but it is now broken in to a distance of several feet from the original outlet, the sewage stagnating and forming a slough of thick black mud many yards in extent, the evil being intensified by the admixture of filth from several closets which here discharge on to the surface, while the offensive nature of the deposit is aggravated by the admixture of salt water which flows over it at spring tides.* This nuisance occurs in the vicinity of one of the principal thoroughfares of the town, and has been suffered to exist for a considerable time, the Inspector of Nuisances informing me that last summer about 40 cartloads of filth were removed from this spot. Again, certain houses and closets drain into the waste leat in its course from the reservoir to its entrance into Mill Bay. Other houses situated in Albert Road and neighbouring localities drain into the Stonehouse Creek, where 14 or 15 outlets may be seen creating abominable nuisance just below Arundel Crescent. And again, certain terraces and nearly the whole of the suburb of Laira, consisting of about 70 houses, drain into cesspits, the solid matters being allowed to accumulate for an indefinite period, while the liquid filth overflows or escapes by percolation, causing much atmospheric pollution and soil saturation.

With regard to the four drainage districts:—

(1.) *The North District*, comprising a small area of about 13 acres, contains only a few houses, which, with their closets, originally drained into cesspits, but this was the cause of such well-grounded complaint that the matter was brought under the notice of the Local Government Board, who, in September 1873, instructed one of their engineer inspectors, Mr. Harrison, to inquire into the merits of the case, with the result, that upon his recommendation a main sewer was laid down, the work being completed as recently as 1876. As carried out, however, this sewer has violated the provisions of the Public Health Act and the Rivers Pollution Act, for the sewage is discharged into a watercourse without being subjected to any process of purification. Moreover, the discharge takes place in the vicinity of dwellings, and is complained of as creating nuisance.* Immediately after receiving the sewage the watercourse enters the Plympton Rural Sanitary District, and running through meadows for a distance of about three-quarters of a mile, ultimately empties into the Laira. The Sanitary Authority, I understand, have in contemplation the including of additional houses in this system, thereby increasing the existing evil. Further there is in this particular neighbourhood much unoccupied land which in all likelihood will in a short time be much built over, rendering it all the more important that immediate steps should be taken to provide for the wholesome disposal of the sewage.

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* As this report is passing through the press, I hear with much concern of the death of Dr. Littleton; I believe from some of the after consequences of this fever.

As other matters that have come to my knowledge since my inspection of the places above referred to I may mention (1) that the Friary Green sewer has been repaired and drains have been laid down for the conveyance of the contents of the closets; and (2) that a memorial has been recently addressed to the Sanitary Authority of Plymouth by 24 residents and owners of property at Lipson, directing attention to the nuisance to which they are exposed from the discharge of sewage into the watercourse near their dwellings.

(2.) *The South District* covers about 15 acres in the neighbourhood of Sutton Pool, the main sewer discharging into the Catwater below water.

(3.) *The East District* embraces 390 acres, including Tavistock Road and many populous streets to the eastward. The main sewer passes down the steep decline of Tavistock Road and Old Town Street, then through Treville Street and Exeter Street, and formerly had its outfall into Sutton Pool, but in 1856 the sewer was prolonged through Coxside and Sutton Road to Deadman's Bay, where the sewage is received into a tank and thence discharged into the bay at low water. In order to prevent the sewer becoming choked at the lower levels a catchpit is placed at Treville Street to intercept the débris and road washings brought down by the storm water from the higher levels, and to allow of the subsidence of the solid particles of sewage. The catchpit is closed and no provision made for the escape of sewer air at this point. The pit is cleared out as occasion requires, giving rise to great nuisance, of which I have received the following graphic description from a resident in Treville Street. He writes: "Once in about every three months a cesspit is opened in front of my house, "the filth is hoisted out and dragged in trollies about 20 yards down the street. "Why it is not tipped at once from the pit's mouth into a slush cart, I cannot understand. "The effect of this horrid process, continued through three nights generally, "is to cause the liquid abomination to percolate the soil for about 200 square yards of "the open street, rendering the air perfectly unbearable for days after. A little, and "very little, disinfectant is thrown over the mess, and this goes on in the very heart "of a civilised community." With reference to this letter I would merely remark that I received substantially the same report from other residents of the locality.

(4.) *The West District* is the most populous area, comprising about 270 acres situated between Tavistock Road and Mill Bay, and containing streets and houses at the high levels, as well as in the valley, where it should be noted many of the streets are below the level of high water. Formerly the drainage of this district went chiefly into the waste leat in its course from the reservoir to its entrance into Mill Bay, but this gave rise to so much nuisance that in 1867 a new main sewer was laid down to receive the contents of the other sewers and to convey the sewage direct to Mill Bay, where it is discharged near the gates of the Great Western docks, a little above low water. The discharging of such a volume of sewage into the very centre of the busy operations of the shipping trade must be regarded as a very serious evil, for not only is the atmosphere fearfully polluted by the escape of the pent-up sewage from the tanks, as I can testify from my own experience, but the deposit of sewage mud in the neighbourhood of the outfall is so considerable as to necessitate frequent dredging to prevent the channel of the outer harbour becoming blocked. The magnitude of this evil will be better understood by consideration of the fact as represented to me by gentlemen thoroughly conversant with the subject, "that 3,000 tons of solid sewage" are annually deposited in the outer harbour, and 5,875 tons have been dredged out of the channel during the last two years, leaving a large quantity behind on the slopes or distributed over the surface of the harbour; they further stated that the effluvia from the deposit at low water is most offensive, and the same is observed when the mud is disturbed by the dredging machine, or by large steamers coming into the dock. It would appear that when the wind is in the direction of the town the stink of the sewage may be detected a long distance off.

In view of the risk of the sewage backing up into the houses at high tide, special provision has been made in the way of a stone tank built in the sea-wall of the docks to receive the contents of the main sewer. This tank has a cubic capacity of 112,575 feet, and is provided with several outlets which are placed at three different levels to admit of the outflow of the sewage according to the rise and fall of the tide. It would appear, however, that the precautionary measures thus adopted have proved insufficient to avert the evil consequences anticipated, in respect of certain portions of the district that are below the level of high water, including Bath Street, Granby Street, Flora Street, Rendle Street, and parts of Union and King Streets, the inhabitants of these localities being subjected to occasional flooding of their yards and houses, owing to the overflowing of sewage from the inlets of their drains. This was observed by some intelligent persons to be coincident with heavy rainfall occurring at high tide, the drains continuing to overflow until such time as the tide receded, when upon the subsiding of the water from their premises a thick deposit of offensive black mud was left behind.

The nature of the deposit, as well as the manner in which the fluid escaped from the drains, would seem to indicate that the flooding was due to the backing up of the sewage; the result, doubtless, of the capacity of the tank not being adequate to the increased volume discharged into it during heavy rainfall at high tide. In support of this explanation of the flooding I would submit the following points for consideration:—

(1.) At each tide the outlets of the tank are all closed for a period of five hours and upwards, the highest outlet being much below the level of high water, and thus not freed till some time after ebb tide has set in.

(2.) The capacity of the tank, as already stated, is equal to 112,575 cubic feet, and the area drained is 270 acres, equal to 11,761,200 square feet. Now, supposing the rainfall upon the said area to equal half an inch in the five hours and upwards that the outlets are under water, this would amount to 456,000 cubic feet of water, or more than four times the capacity of the tank. And although a portion only of this rainwater would find its way into the sewers, yet, when it is considered that the house drainage of the district is also received into these sewers, there can be little doubt that during the time the outlets are closed the amount of sewage brought down would be far in excess of what the tank is capable of holding, and thus cause it to back up into the drains, occasioning the flooding complained of.

The late Mr. Bampton, formerly the town surveyor, proposed to convey the sewage from the high levels by a separate system, but his suggestion was not acted upon, the plan of the tank, as above described, being preferred, with the original intention, I believe, of pumping out the sewage during high tide. This, however, has not been carried into effect, and it now remains an important question for an engineer to decide as to the best means of remedying the evils herein pointed out.

With regard to the house-drains:—

A number of old stone drains exist in the town, and I am told that many of the best houses are dependent upon these for the removal of their sewage. Such of them as came under observation were very imperfect, the contents percolating through their sides, or overflowing, owing to the drains being broken in and the passage blocked. The inlets were, to all appearance, carefully trapped, but the escape of sewer air in their vicinity was very perceptible, and upon closer scrutiny was found to proceed from holes near the trap leading direct from the surface into the drain. Where earthenware drains have been substituted, or laid down independently in connexion with new houses, these, in many instances, offer practically no advantages over the old drains, the pipes not being properly laid, and the traps not closely fitted into the drain pipes. The bell-trap, which is in very general use, is often found to be broken or displaced, thus permitting free escape of the foul air, while the old superseded drains, instead of having been filled in, remain intact, thereby offering another channel for the escape of such air in the vicinity of dwellings; likewise sink and waste-water pipes from the interior of houses are occasionally met with in direct communication with the sewers. Again, the connexion of the *house-drains with the sewers* has been very imperfectly effected, the point of junction not being properly cemented, and the work in some instances altogether scamped, the drain pipes being simply laid without any attempt to establish such connexion; and I am informed that although in the process of construction of some of the new sewers proper arrangements were made at intervals for the ultimate connexion with the house drains, the workmen, when the time came, instead of availing themselves of this provision, broke the walls of the sewer at any convenient spot, and inserted fresh pipes without any proper junction. The same culpable negligence has been displayed in the junction of the *soil pipes with the house-drains*, instances coming under observation where, upon opening up the ground, a space was found to intervene between the soil pipes and the drain, the contents of the former soaking into and saturating the soil. Further, as regards the sewers and drains, I received very general complaints of their frequently getting blocked, and upon inquiry this would seem to be due partly to the evil of discharging excrement into them from closets that are unprovided with means for flushing, and partly to their not possessing a proper gradient. Thus in Neswick Street, where some houses and closets were in the process of erection, I had the opportunity of examining into the condition of the sewer, and found at the part where the soil pipes were introduced, stagnant sewage to the depth of 14 inches, three of which consisted of black mud, so that the sewage had not a free flow. It is obvious that when the closets are brought into operation the evil will be increased. Again, as affecting the question of gradient, a sewer has recently been laid to convey the sewage from the Houndiscombe sewer to the North Road sewer, but I am informed by a gentleman (an architect of the town) that this intercepting sewer is laid at a higher level than the Houndiscombe sewer.

The flushing of the sewers would seem to be a point altogether neglected, although I understand that the water of the waste leat might be utilised for this purpose at two or three different places.

As regards the ventilation :—

The sewers and drains are virtually void of systematic ventilation, there being only about six or seven ventilating shafts. These are placed on the eastern and western main sewers; but no such provision has been made for the rest of the sewers. Recently, however, in compliance with a loudly-expressed wish on the part of the public, the Sanitary Authority have consulted an engineer as to the best means of providing for this ventilation.

From the foregoing statements it is obvious that the drains are very defective and imperfect, causing, from faulty construction and other circumstances, much soil saturation and atmospheric pollution, the latter becoming locally dangerous from the want of due ventilation of the sewers.

The surveyor informs me that before laying down new sewers it has been the custom to submit the plans to the Sanitary Authority, and when these have been approved he has supervised the construction of sewers; but no supervision has been exercised over the junction of house-drains with the sewers, a very grave omission, seeing that the efficiency of house drainage is, in a great degree, dependent upon such connexion being properly effected.

Water supply.

The *Water Supply* is derived from the hills of Dartmoor, and passes into the town by gravitation. The gathering area covers about 4,000 acres, whence issue various streams which, uniting, form the River Meavy. This river is dammed and the water diverted into a channel known as the "Plymouth leat," which runs open from the weir-head to the reservoir at Knackersknowle, whence the water is conveyed by iron pipes to a second reservoir at Hartley, and thence to the town of Plymouth, in all a distance of about 14 miles. The water is then distributed by branch mains to various localities, one going to the citadel at the east end of the Hoe; another to the Admiralty reservoir, for the supply of the Marine Barracks and Victualling Yard at Stonehouse; a third to the Drake reservoir on the Tavistock Road, for the supply of the town, with the exception of parts and suburbs situated above the level of the reservoir, which obtain their water direct from the main in its course from Hartley to Plymouth; and a fourth branch affords a supply to certain mills when water can be spared for the purpose.

Drake reservoir is situated at 150 feet above sea level. The water is delivered at high pressure, and can be carried to the summit of most of the houses. Since 1874 the supply has been on the continuous system, and the water is said to be laid on to each house, save where houses are clustered together in a small court, when one stand-pipe is made to serve for the whole number, and, so far as my observation went, this afforded a convenient and abundant supply. The water-mains consist of iron pipes, but the small service pipes are of lead.

With regard to the purity of the water :—

(1.) *At its source.* The catchment basin rises to a height of about 1,300 feet above the sea. The soil is of a granitic character, and the area said to be almost without inhabitants, consisting chiefly of pasture land and a small proportion of arable land, which is not highly cultivated. *From the weir-head to the reservoir* at Knackersknowle the water, as already stated, runs in an open leat, passing in its course through the village of Roborough, and subsequently in the vicinity of a clump of five or six cottages. The houses in the village with one exception being at a lower level, and the slope of the land away from the leat, drainage from them cannot endanger the water, but not so as regards the privies belonging to the clump of cottages; these being at a higher level, suggest danger. Special provision has been made to protect the leat from road washings, but doubtless in its course through fields there is exposure to pollution from fouling by cattle and from surface impurities, the fall of the land in some localities being towards the leat and very rapid. Moreover, the inhabitants in the neighbourhood of the leat derive their supply direct from this source, thereby suggesting possible risk of pollution through the casual emptying into it of vessels and such like contingencies. It is due, however, to Mr. Bellamy, the engineer in charge of the Waterworks, to state that, so far as precautionary measures can avail to protect an open watercourse, due vigilance has been exercised.

There are no filtering beds, but upon the recommendation of Mr. Bellamy three sets of wire gratings of varying gauges have been constructed, through which the water passes into a small settling tank, thence through a bed of stone, and so on to the reservoir. In this way the principal parts of such foreign matters as were held in suspension are removed.

(2.) *In its distribution.*—Having visited the reservoirs, I may state that all, as far as my observation went, were in a satisfactory condition, with the exception of the Admiralty reservoir, which gave evidence of percolation into it, and the overflow-pipe from which, moreover, is in direct communication with the sewer. Formerly the surplus water was conveyed by a channel to Stonehouse Creek, but this passage has been filled up, and the connexion with the sewer substituted, thereby endangering the purity of the water in this reservoir, but not affecting, it should be noticed, the general supply of the town.

In the course of the water circulation there are about 200 or 300 dead ends which I was informed are systematically washed out once at least in every six weeks; complaints, however, are sometimes made of the purity of the water obtained in their vicinity.

The water is frequently drawn direct from the pipes by means of taps, but there are a number of cisterns, many of which were in a very unwholesome condition, consisting of rotten wooden tubs; these, however, are being abolished, and slate cisterns substituted. But the cisterns are sadly unprotected, and admit of *débris* of all kinds being thrown into them, of which there was abundant evidence in bits of fish, vegetable, bread, tobacco-pipes, &c. &c. present in the water, the people stating they could not get their landlords to furnish covers, and they found it impossible to prevent children throwing stuff into them. The bottoms of many cisterns were covered with mud, showing due attention is not paid to the cleansing of them.

Formerly a great many of the waterclosets were in direct communication with the water mains, but this being recognised as a danger, the connecting pipes were squeezed together at the lower ends. I did not detect water escaping from the said pipes into the closets.

Throughout my inquiry I did not find any indication that the general water-supply of the town as it is delivered to the houses, had been associated with disease. But the case was different with the water-service of particular houses. Here in many instances the water has been liable to contamination in the ways above described, and also through the connexion of the drinking water cistern with the water-closet and its drains. To the latter very hazardous condition there is reason to ascribe frequent and serious pollution of water in particular houses, and in a subsequent part of this report instances will be given of disease having appeared to be produced by this means.

With regard to the amount of supply.—This at all ordinary times is said to be abundant, affording 25 gallons per head daily, in addition to meeting all trade requirements and town purposes. The reservoirs contain altogether about 11 million gallons, equal to about three days consumption, but there are no storage tanks; so that in the event of long-continued drought, the supply might fall short of the requirements of the people. I have been favoured with the perusal of Mr. Hawksley's report on the water supply of the town, and I find that he advocates the providing of filtering beds and storage tanks, which recommendation seems to me highly desirable should be carried into effect.

Excrement removal and disposal.

Excrement removal is commonly effected by means of closets, which for the most part discharge into the sewers, but some empty into catch-pits having overflow-pipes to the sewers, others into cesspits, which are closed and unventilated, whilst a few, at Friary Green, discharge on to the surface, the excrementitious matter coursing along the ground and producing most obnoxious nuisance.* The closets belonging to the poorer class of houses are usually situated out of doors, often in confined courts or alleys within a few feet of the doors and windows of the dwellings, while many are built against occupied rooms or situated immediately beneath them. The closets generally are unprovided with means for flushing; as a consequence, the pans are corrugated with excrement, while many of the closets are so filthy as to render them unapproachable, and others also are much dilapidated.

In the large old-fashioned houses now let off in tenements to the poor the closets are found indoors, occupying any available spot to economise space, sometimes in dark cellars or underneath the staircase, and in one place ingenuity had so contrived that the staircase actually was made to serve the purpose of a closet, one of the stairs being fitted with hinges to form a lid to a closet-pan beneath of the usual type, the pan, moreover, being used as a sink for general household purposes. The closets of these tenement houses have no arrangements for flushing and often no opening to the outer air; as a consequence the washing down of the pans is often altogether neglected, resulting in frequent lodgment of excrement in the soil-pipes and drains, while the darkness of the closets serves to conceal the grossest neglect of cleanliness in respect of their general condition. As regards the closets belonging to the better class of houses these are situated within doors and are provided with flushing cisterns; several, however, have no communication with the external air. The soil-pipes of the closets generally, are unventilated.

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* This nuisance has been remedied since my visit to the locality.

Numerous examples will be adduced in illustration of the foregoing, but enough has already been stated to show that the closets in their present condition constitute a very serious element of danger to health, particularly when it is remembered that the sewers and drains being void of systematic ventilation, the closets offer a ready means for the escape of sewer air into the dwellings, either directly or indirectly, according to their relative positions. Of this I had frequent experience, not only in the dwellings of the poor, which in many cases were pervaded with a smell of sewer air sometimes to such an extent as to indicate the situation of the closet whence the nuisance emanated, but also in the better class of houses, where on raising the valve an immediate rush up of sewer air was perceptible.

As regards the amount of accommodation.—This is lamentably insufficient, some privies being common to a number of families, varying from four to twenty, while certain houses in the heart of the town remain totally unprovided.

Examples of the foregoing:—

(1.) *No.* 18, *Lower Lane.*—Closet on basement floor; no means of ventilation or light. On striking a match the state of filth disclosed was fearful beyond description.

(2.) *No.* 2, *Southside Street.*—Closet, used by ten families, situated in a small court, within about 6 feet of a window, rendering the room so offensive that the occupant said she could not take her meals in it.

(3.) 62, *Southside Street.*—Closet (used by nine families) apparently discharging into a catchpit situated in a confined yard. The pit was choked some three months ago, when several barrow-loads of filth were removed. The place is infested with rats. One poor family living in a room opening on to the yard had to change the position of their bed, the stink in the room being so bad they could not sleep; upon examination the nuisance was found to proceed from rats holes in the floor communicating with the drain.

(4.) *Three houses in Pin's Lane.*—No closet; the contents of the chamber vessels are emptied into the drain inlets, within 3 or 4 feet of the doors of the dwellings, where the filth remained at the time of my visit.

(5.) 5, *Higher Battery Street.*—No closet; all slops and the contents of chamber vessels are emptied into an untrapped drain-inlet situated inside the dwelling. The inmates usually suffer from sickness owing to the stink which pervades the house, and which is so bad that it is even complained of by passers-by in the street.

(6.) 19, *Southside Street.*—Closet on ground floor. No water for flushing, and no opening to the outer air. The whole house more or less offensive. The woman who has lived there for about nine months informed me that she had never been well since she came to the house, and her daughter at the time of my visit was dangerously ill from constant vomiting attributed by the medical attendant to the unwholesomeness of the dwelling.

(7.) *Looe Place.*—Seven houses. Closets situated in a very narrow confined passage behind the houses, which latter were pervaded with fœtid odour. One child had been ill for seven weeks, and I was told that the medical man ascribed the illness to the air from the closet.

(8.) 14, *Looe Street.*—One closet (common to about 100 people) situated in a court. A woman whose house opens upon the court says the nuisance from the closet is so great that she cannot eat anything, stating that the former tenant made similar complaint. Two new closets have been built in this court, but at the time of my visit had not been handed over to the people.

(9.) 2, *Kinterbury Street.*—Closet under the staircase. Soil pipe and pan broken, Sewer air escaped into the house to such an extent that the inmates could not bear to live in it. The Inspector of Nuisances was applied to, when a new pan was put in and the soil-pipe trapped, but at the time of my visit the house still stank abominably, having been shut up for an hour or two; and upon examination I found the nuisance emanated from the sink-pipe close to the closet and leading direct into the soil-pipe.

(10.) 147, *Wyndham Cottage.*—Closet very foul; situated in a small, badly-paved yard, while in a narrow lane in front of the house is a large covered cesspit which receives drainage from closets, and from houses in the vicinity and has an overflow drain to the sewer. This drain recently becoming choked the cesspit, which had not been cleared out for five years, was emptied, when five cartloads of filth were removed.

(11.) 23, *Laira Street.*—Closet adjoins the sitting-room. The wall dividing them is in holes. Typhoid fever occurred in this house, and was referred by the Medical Officer of Health to foul air from the closet.

(12.) *Higher Battery Street* also *New Street.*—Afford examples of foul, damp closets situated in cellars, and having no water for flushing.

(13.) *Two houses, Mill Bay Road.*—The closets are situated indoors and have no provision for flushing; one of them, moreover, opens into the sitting-room, and has no means of ventilation or light.

(14.) 42, *Richmond Street* (Tenement).—Lower room stands between two closets, both in a filthy condition. The occupant of the room stated that since she came to the house she had constantly suffered from nausea and headache, which she attributed to the stink from the closets.

(15.) 7, *Richmond Street.*—Closet situated at the end of the passage under the stairs; the only opening to closet is into the house, and the paint on the walls of the closet is turned black by the action of sewer air.

(16) 132 *King Street.*—Closet in yard, used by 9 or 10 families, discharges into a square pit which communicates with the sewer by means of a drain passing under the house. At the time of my visit the pit was 4 or 5 inches deep with filth, and most offensive.

(17.) 129, *King Street.*—Closet stinking fearfully, untrapped, and no water for flushing.

The localities here quoted afford numerous other examples, differing only in degree of foulness, but the above may serve as an index to the excremental nuisances met with throughout my inspection, I might almost say at every step of my inquiry.

Refuse removal.

The Sanitary Authority contracts for the *removal of refuse*, but the duty for a long time was so inefficiently performed as to give rise to general dissatisfaction, till at last the Sanitary Authority threatened to stop payment unless the contractor fulfilled his compact. Whereupon he (the contractor) contended that it was not part of his agreement to remove refuse from premises, and that in future he should not allow his men to fetch it out. To meet this objection the Authority appointed men to accompany the scavengers' carts, and to bring out the refuse from the yards, &c. This system has now been in operation some three or four months, resulting, I am told, in great improvements; but however this may be, the large accumulations of refuse frequently met with is convincing proof that the work is still very indifferently performed; in short, the whole system of refuse disposal in the town of Plymouth is fraught with evils liable to exercise a baneful influence upon health. In the first place the houses are not provided with suitable receptacles, and as a consequence the refuse of many families is heaped together in any accessible spot, whether yard, court, or wash-house, there to await the visit of the scavenger, who is said to be very irregular in his rounds, calling at some places two or three times a week, at others once a week only, while sometimes a fortnight, three weeks, or even more elapses between his visits. I would point out that a week's accumulation of refuse from a number of families stored near their dwellings is an injurious nuisance, more particularly in the height of summer where the offensive nature of such collections is intensified. Of this I had frequent experience during my inspection, and in one case, in King Street, the stench from one of these heaps was so abominable and sickening that knowing a dangerous case of infantile diarrhœa to be present in an adjoining house, I sent for some chloride of lime, and instructed the people to throw it on the offending mass. It should be mentioned that fish forms one of the chief articles of diet amongst the poor, also that the vegetable supply is plentiful; the waste from such matters therefore enters largely into the refuse heaps and this will account for their peculiar offensive character, and the warm moist air of Plymouth promotes decomposition of such matter. Hence it is of pecular importance that the Sanitary Authority should secure the early and efficient removal of such refuse from the vicinity of dwellings.

Further, the process of removal is attended with evils that might be avoided, for the refuse carts, instead of being properly covered, are merely fitted with tarpaulin to be drawn over the contents when the carts are full. Even this precaution is frequently neglected, the particles of refuse meanwhile being scattered by the wind, and the noxious effluvia escaping freely and polluting the atmosphere.

Lastly, the vast accumulation of refuse at present stored at the depôt, amounting to some 3,000 tons, is far in excess of the quantity that should be amassed there, for although the site of the depôt was approved of for the purpose, on the occasion of my inquiry jointly with Mr. S. I. Smith, in 1877, still it was never contemplated that accumulations on so gigantic a scale would be permitted by the Authority.

Street cleansing, &c.

The streets, as a rule, are clean, and well swept, but I received loud complaints of the Barbican Quay, at Sutton Pool, where fish is daily landed and sold in large quantities. The surface is paved with stones set on end, and is washed down after the fish is disposed of, when the water soaking in between the stones causes offensive nuisance. This might easily be obviated by substituting for the present pavement hard concrete or asphalte with an incline towards the drains to facilitate the running off of the water.

The condition of certain of the new streets is very unsatisfactory, owing to their not having been properly levelled. Tracey Street, in particular, which has been opened some three or four years, has holes and gullies so deep as to endanger horse traffic, while many of the old streets are in a very bad state, Cambridge and Library Lanes offering examples of the surface broken in almost to the sewers, and Armada Street, the lanes on either side of Wells Street, and that between Wellington and Waterloo Streets, showing slop and waste water standing in puddles or coursing along the ground. On the other hand, several narrow lanes and thoroughfares have, during the present summer, been limewashed by direction of the Sanitary Authority; and it is to be regretted that such good work has not been general amongst owners of private yards and courts.

Keeping of domestic animals.

The keeping of domestic animals in the vicinity of dwellings is a recognised necessity in large towns, and Plymouth offers no exception to the rule, horse and donkey stables thus situated being frequently met with. Many of these places, moreover, exhibit serious disregard of sanitary precaution, the floors being sodden with filth, while manure is stored in large quantities outside; and it is no uncommon thing to find in the narrow back streets the same old stable litter spread out day after day to dry in the sun, greatly to the discomfort of the poor people living in such streets. Moreover, examples are not wanting of inhabited rooms, through dilapidation coming to be in direct communication with foul stables. An exaggerated nuisance of the kind came under observation at No. 24, Morley Street, occupied by three or four families. Here the floor of one of the rooms is completely broken through, the effluvia from the stable beneath pervading the whole house to such an extent that the poor people say they can scarcely live in it, which I can readily understand, for at the time of my visit the stench of ammonia was so strong as to make my eyes water. The offending stable was in a filthy state, and a heap of manure stood in one corner of it.

Slaughter-houses and other offensive trades.

There are 13 slaughter-houses, viz., 11 private and two public ones, and all save one of the latter are registered. They are situated, for the most part, in crowded localities. The floors as a rule are fairly well paved, and the walls are tolerably satisfactory as regards limewashing; but beyond this, these establishments, with one or two exceptions, exhibited conditions of foulness totally at variance with the care which should be observed in carrying out a business that is concerned with human food. In some instances the lower parts of the walls were much bespattered with blood, while carts containing dung and garbage occasionally mixed with blood, and so encrusted with filth as to testify to their never being cleansed, were very frequently present in the houses. Moreover, due care is evidently not shown in catching the blood, for much of it is allowed to go into the sewers. Again, the animals prior to slaughtering are often kept, for the purpose of fasting, not in proper lairs or stables, but in the actual slaughter-house, or in a shed leading out of it; and sheds of this kind were seen in a very neglected state, the floors being thickly covered with manure. The public slaughter-house on the quay, and No. 4 Slaughter-house, Library Lane, call for special mention, being so pre-eminently filthy as to render a visit to them revolting in the extreme. The former measures 75 × 36 feet, is lofty, well ventilated, and properly paved, the floor having an incline towards the centre, where drain inlets are placed. Inside the building, at the upper end, is a large inclosure, subdivided into four sties, and containing, at the time of my visit, nine pigs; two of enormous size had been there upwards of a week; while immediately outside the entrance of the slaughter-house is another large sty, which contained three pigs, and close by it lay a week's accumulation of dung and garbage. The sties were in a filthy condition, the floors being inches deep with pig-manure. I am told they are seldom or never empty, and that sometimes pigs are kept in them a fortnight prior to slaughtering, the people in the vicinity complaining loudly of the nuisance arising from them. Much of the blood is allowed to pass into the sewers, the remainder is stored in a wooden barrel and is said to be removed three times a week; meanwhile the barrel, which is never cleansed, stands in the slaughter-house. The walls of the building had not been limewashed for 12 months, and were bespattered with blood at the lower part. Further, one of the drain inlets was choked, and had been so for two or three years, the stench arising from it as the noxious gases bubbled to the surface being in the highest degree sickening, while, hanging up, exposed to the septic influence of all this reeking filth, were several carcases intended for human consumption. The weather, moreover, at the time was very sultry, thus promoting speedy decomposition. I should mention that the other public slaughter-house is situated near the market place, and contrasts favourably with the one above described, inasmuch as its general condition betokens care and attention to cleanliness. But here the blood, instead of being placed in separate vessels and immediately removed, is collected in a wooden cart, together with dung and garbage, and carried away twice a week to a neighbouring farm, the cart in the meantime standing in the slaughter-house yard, and the contents leaking away.

No. 4 Slaughter-house, Library Lane, opens into the fasting shed, the floor of which was thickly covered with manure which drained to a hollow, there mingling with blood from the slaughter-house, and together forming a most revolting pool, whence the filth is said to be scooped out twice a week, and removed in a filthy cart along with garbage and dung.

The Sanitary Authority possess byelaws for the regulation of the slaughter-houses, whereby it is enacted that all manure, garbage, and filth shall immediately after the slaughtering be placed in boxes or vessels with tight or closely fitting covers, and that all blood shall be put in separate vessels of the same kind, and shall be carried away without delay and shall not be permitted to flow in the channel or sewers, &c., and that such vessels shall immediately after such removal be thoroughly cleansed and purified. Further, that the slaughter-houses shall be kept in such a condition that neither within them nor without them shall there be any offensive smell arising therefrom. Comment is needless as to the extent to which these provisions have been disregarded, but I would point out that the grossest infringement is instanced in the slaughter-house on the quay belonging to the town council itself.

Other offensive trades.

Under the head of other offensive trades may be classed manure and chemical works, sugar refineries, tripe-boiling establishments, &c., all of which have recently been fully reported upon by Dr. Ballard, who has made recommendations as to certain measures to be adopted to prevent nuisance in the carrying out of the various processes connected therewith. It is not necessary for me, therefore, to do more than state that I received frequent complaint of the offensive effluvia caused by these trades, and have myself experienced the same. Unquestionably they are very displeasing to the senses, though the extent to which they may affect public health has appeared uncertain and undefined. They form a fitting subject for the skilled and persistent observation of the Medical Officer of Health.

Bakehouse Regulation and Sale of Food and Drugs Acts.

The provisions of the Bakehouse Regulation Act have not been enforced, hence the bakehouses have not been subjected to inspection, but everything connected with them has been left entirely to the option of the individual baker, with the result that while many I visited were in a satisfactory condition, two or three were in unwholesome relation to foul closets or drains, and several others were greatly in need of limewashing, the walls not having been so cleansed for 10 or 12 months.

No public analyst has been appointed and no action taken under the Sale of Food and Drugs Act.*

Common lodging-houses.

The common lodging-houses (12 in number) are all registered, and are the subject of byelaws. They are placed under the supervision of the police, whose duty it is to inspect them, and report their condition to the watch committee.

The police inspector submitted to me a book purporting to be a register of all particulars relating to the lodging-houses, but the last entry bore date November 1872, and upon comparing the particulars therein given with the results of my own observations, I found them so utterly at variance as to invalidate the book of all claim to be regarded as a register of the existing lodging-houses. This will appear by reference to the subjoined tabular statement showing entries in the register side by side with corresponding particulars noted down from my own inspection. I may add that one house (23 Howe Street) is shown upon the register, which, upon visiting, I found had been closed as a lodging-house for a year or two. With regard to the numbers of beds shown in the Table it should be stated that the byelaws in force date from 1852, and make no restriction as to the number of occupants per bed, while the so-called register provides for two persons in each "bed,"* except in what are called "half beds." The byelaws are being revised, and should certainly provide against the continuance of the objectionable arrangement of bringing together in one bed two dirty male tramps.

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* Since my visit to Plymouth an analyst has been appointed; viz., in October 1878.

Abstract of Register.			Result of my own Observations.	
House.	No. of Rooms.	No. of Beds.	No. of Rooms.	No. of Beds.
Solomon's - -	1	3	2	6
Enrich's - - -	6	15½	2	11
Thompson's - -	3	7	5	16
Rossi's - - -	7	18½	7	21
Marshall's - -	3	8½	4	17
Hick's - - -	4	12	4	14
Smith's - - -	6	19½	11	45

At my interview with the clerk of the town council I mentioned the subject of these inaccuracies, and on the following morning received an amended list, but this also presented many discrepancies when compared with my own observations as above noted, Marshall's house being entered as containing 10 beds instead of 17; Enrich's seven, and two half beds, instead of 11; Solomon's, four beds instead of six; and the same with regard to the description of the rooms, the measurements being at variance with my own, which were taken with care, and rooms with two windows being represented as having only one. Moreover, mention of one house (Kelly's) was altogether omitted.

As to the supervision of these houses, some lodging-house keepers represented them as being inspected weekly or fortnightly, others once or twice in two or three months, and in one case two or three times a year only. I am not in a position to decide as to the merits of these statements, which were contradicted by the police inspector, but the condition of many of the lodging-houses, as revealed by my recent inspection, testifies to the supervision exercised not being of a nature to secure due observance of the regulations in force, instances being met with of overcrowding combined with dilapidation and dirt, while the closets generally were in a filthy state.

The following examples will serve to illustrate the foregoing conditions:—

(1.) *House in Lower Street.*—The roof fallen in to such an extent as to render the house damp and dangerous for habitation. It had been in this state for some weeks. The closet, which was used in common by the lodgers and occupants of other houses, had the roof off, and was in such a filthy state as to be scarcely approachable. I should state that subsequent to my visit this house has been closed, and was so returned on the amended list.

(2.) *Solomon's House* (King Street).—The walls were much cracked and had not been limewashed for upwards of 12 months.

(3.) *Enrich's House* (King Street).—Roof much dilapidated, and rooms in consequence very damp. One room having a cubic capacity of 2162·8 feet contained six "beds," giving 360·4 cubic feet per "bed"; the other (an attic with a sloping roof), having a cubic capacity of 1157·6 feet, contained five "beds," and it was acknowledged that sometimes each bed accommodated two persons, thus allowing 115·7 cubic feet per individual. The closet in the yard had no proper pan, and the floor, which was quite loose, on being lifted disclosed a foul drain running to the soil pipe and stinking abominably.

(4.) *Thompson's House* (King Street).—Tenement consisting of three rooms with ten "beds," ceilings much broken and walls very dirty; cubic space *per bed* varying from 388 to 400 feet.

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* In the examples to be quoted lower down I shall put the word "bed" between inverted commas to remind the reader of the practice now adverted to,

(5.) *Warn's House* (King Street).—One room, having a cubic capacity of 1,044 feet, contains five "beds"; acknowledged to be sometimes occupied by eight people, thus giving 130·5 cubic feet per head; closet, dilapidated and dirty, adjoining the kitchen.

Many other instances might be adduced of cubic space *per* "*bed*" ranging from 350 to 400 feet, and as each bed as occasion requires is allowed to be occupied by two persons it follows that much overcrowding is permitted in these lodging-houses. Here it should be mentioned that the regulations require that each lodging-house keeper shall keep suspended in each room a ticket stating the number of lodgers allowed to be received. But in *no* instance did I find this complied with. In like manner the regulations providing that the walls and ceilings of every room shall be well and sufficiently lime-washed twice at least in every year, also that the waterclosets shall be kept clean in all respects, have evidently been disregarded.

Dwellings and their precincts.

Having already stated that the houses generally, not excepting those of the better class, are more or less exposed to the risk of sewer air escaping into them from defective closets and drains, I have now to refer to other unwholesome conditions affecting the dwellings of the poor, and which may be summarised as consisting in the crowding together of houses, defective ventilation, dampness, dilapidation, dirt, and overcrowding; evils which, from personal inspection of houses in almost every street, alley, and court of Plymouth, I may state, exist to a very serious extent. As may be supposed, they are met with chiefly in the old portions of the town, where dwellings formerly occupied by well-to-do persons have in process of time come to be sub-let in tenements, one room frequently serving for a whole family by night and day. Such houses, never well adapted for sub-letting among many families, are now seriously overcrowded, while the gardens appertaining to them have been built over by tenements running out from the back of the original dwellings, consisting each of from two to four or more rooms, often occupied by as many families. In this way houses in many parts of the town stand so thickly together as to leave scarcely any ground space between them. Again, many dwellings stand back to back, thus preventing through ventilation, and are often so shut in by other houses or high walls as to cause stagnation of the atmosphere around them, and when it is remembered the extent to which such atmosphere is polluted by emanations from refuse heaps and other causes before referred to, the unwholesomeness of the dwellings can scarcely be exaggerated. The system of sub-letting in tenements prevails so generally in the town, that the majority of houses I visited were tenanted by a number of families renting each, one, two, or more rooms, according to their means. In some instances the rooms were clean and comfortable, but very many were in a dirty, neglected condition, the walls and floors of the rooms and passages much broken and cracked, and black from the want of limewashing and scrubbing, while the air of the rooms was stuffy and offensive. In addition to the evils here enumerated, many houses suffer from dampness, due in some cases to the outer walls and roofs being in a ruinous state, in others to defective water-shoots, bad drainage, or to the pavement of the yards being broken and irregular, causing the surface water to stand in puddles and soak into the foundations; in short, many of the dwellings in their present condition are quite unfit for human habitation.

Examples of the foregoing conditions:—

(1.) *Claremont Cottages.*—These dwellings stand in a confined court, about 12 feet wide, each consisting of four rooms, and each room occupied by a separate family. The closets, two in number, are situated in the court. Both were in a very foul condition, and their soil-pipes choked, which is said to be no uncommon occurrence. Immediately over one of the closets, and leaking into it, was the tank which supplies the drinking water. I observed a large accumulation of refuse stored in an old house at the end of the court, so dilapidated as to be in imminent danger of falling in. The scavenger is reported to call round once a fortnight.

(2.) *House at the back of* 6, *Morley Place.*—The walls were cracked and bulged to such an extent as to threaten danger to the inmates, who stated they would be afraid to remain in it another winter lest it should fall upon them.

(3.) *Richmond Street.*—A house recently vacated in consequence of many feet of the outer wall having fallen in a few weeks ago. It would appear that the ruinous state of this house constitutes a danger to the adjoining houses, one of which (No. 50) is also much dilapidated, the floors being broken through.

(4.) *Richmond Lane* (Ham's Cottages.)—Two houses in a very confined court, shut in at one end by a wall. The atmosphere of the dwellings is polluted by emanations from a drain inlet, the bell trap of which was displaced, and from a foul closet situated in the court, at a distance of about 5 feet 9 inches from the dwellings. In the next court the houses stand back to back, and are exposed to similar nuisance from a defective drain, and a very offensive closet in the court, the soil pipe being cut off over a rude inlet of the drain which communicates with the sewer. There is no free circulation of air around these dwellings, a space of about 6 feet only intervening between the lower windows and the wall of the court.

(5.) *Jays Court.*—Closed at one end; contains 8 or 10 houses, some of which face King Street, which is some feet higher than the court, being on a level with the rooms of the first floor. The refuse of some 20 families is stored under one of these houses, and is said to be cleared away once a fortnight, but only very partially, much of it being left behind, as I observed to be the case on the morning of my visit, soon after the scavenger had left, when 8 or 10 inches deep of decomposing filth remained draining into the court, there mingling with slop water and stagnating in puddles in the broken pavement. Three very filthy closets stood in the court, one discharging direct either into a cesspit or a sewer, which of the two I was unable to ascertain owing to the revolting state of the closet precluding further investigation. The wash-house was situated under another of these houses, and adjoining it was a donkey stable. The houses were very dirty, and those at the lower side of the court very damp, and had no through ventilation.

(6.) 112, *King Street.*—House much dilapidated; closet, in yard, had no door.

(7.) 15, *Summerland Street.*—Outer walls so dilapidated as to admit daylight through them; roof in holes, letting in the rainfall, and rendering the whole house very damp.

(8.) 17, *Henry Street.*—Inhabited by six families. Four of the rooms look upon the confined yard which contains a very filthy and dilapidated closet, liquid escaping from the pan and leaking away by the side of the seat; while adjoining the dwelling is another foul closet, the soil pipe of which was choked, and the contents, escaping, saturated the walls of the sitting-room. All the inmates complained of the intolerable nuisance caused by these closets, one poor man, who was confined to his bed, stating that the stink made him feel so sick that he could not take his food.

(9.) *Palace Court, Stillman Street.*—An old palace now let off in tenements. The walls greatly require limewashing; the floors are much dilapidated, and the whole house pervaded by sewer air escaping from a sink just under one of the windows, and from a filthy closet in close relation to one of the rooms.

(10.) 14, *Moon Street.*—The house consists of six rooms, each occupied by a separate family. A poor woman, recovering from childbirth lay in one room, the walls of which occasionally stream with wet from a defective water pipe; moreover the whole house is pervaded by effluvia from a closet situated in a confined court and within 4 feet of this woman's window.

(11.) 2, *Gascoigne Street.*—Here the houses stand in a confined yard measuring about 18 feet by 7 feet, and containing two filthy closets and an untrapped drain. Moreover the yard is so shut in by houses as to preclude free circulation of air; thus the foul emanations from the closets and drain find entrance into the dwellings, rendering them very unhealthy. The drinking water is derived from the closet cistern.

(12.) *No.* 1, *Green Street.*—Occupied by several families. The upper rooms very damp. The closet is situated on the ground floor, and was wet, filthy, and offensive, the stink from it pervading the whole house, and the nuisance sometimes being so considerable as to be complained of by passengers in the street. The parochial medical officer particularised this house as being very subject to sickness.

(13.) *No.* 9, *Higher Street.*—Large props placed in the lower rooms to support the building; floor of the room above much sunken; many feet of the ceiling fallen in; upper part of the house very damp; and the dwelling altogether in such a tumble-down condition that during a storm some time ago the inmates were fearful it would fall upon their heads. This house was reported by Dr. Littleton in 1875 as being much dilapidated. Several cases of diphtheria occurred in it in February last.

(14.) 13, *High Street.*—This house is so ruinous, I was in fear the whole time I was examining it, the stairs being much broken, the floors so sunken as to necessitate their being propped up, and the outer walls in holes; while in the cellar a pan placed over a drain inlet served the purpose of a closet, and in another part of the cellar was a cracked and leaking drain. *This house belongs to the corporation,* and is rented from them by an old woman who says she pays 11*l.* a year for it besides rates and taxes. It appears that formerly she let the upper part of the house in lodgings, but since it has become so dilapidated people are afraid to live in it. She further stated that she had frequently represented the condition of the house to the surveyor of the corporation.

(15.) *Lower Lane* and *Middle Lane.*—Here the houses generally are so filthy and dilapidated as to be quite unfit for habitation.

(16.) *Railway Cottages, Bath Street.*—In a very dilapidated and dirty state. Closets at the end of the court very filthy; one had been choked for months, causing the nuisance, as the people expressed it, to be "extra bad." The wash-house, situated under one of the bedrooms, is so dilapidated that it cannot be used, but is made the receptacle of all kinds of filth, giving rise to so much nuisance that the person occupying the bedroom complained that it made her quite ill.

(17.) 11, *Notte Street.*—Occupied by several families. House damp and generally pervaded by sewer air. The closet, situated on the stairs, is unprovided with means for flushing. A small window from it opens into a warehouse, but at the time of my visit it was closed up, the persons hiring the warehouse stating that the stink was so bad they could not endure it. In the passage on the ground floor is a sink, the pipe from which, together with the soil pipe from the closet, leads to an old drain in the cellar, which was broken in for many feet, the sewage escaping and flooding the cellar to such an extent that it could be entered only at one spot. I received a long and sad history of sickness from the family occupying the rooms immediately over the cellar.

(18.) *Central Cottage.*—Situated in the low-lying part of the town. The floor of the lower room is occasionally flooded twice in a day (presumably dependent upon the tide), and the inmates are subject to sore throat and colds in consequence they say of the dampness.

(19.) *Granby Green, Granby Place, Granby Square, Granby Cottages, and Stafford Row.*—Are all confined courts situated in Granby Street, and for the most part offer examples of aggravated unwholesomeness. Each court is about 16 feet wide, closed at one end and opening into a narrow street at the other end; while on either side are situated about five houses standing back to back with other houses in the adjoining courts. Granby Green and Granby Place may be specially mentioned. The former has a rough stone pavement full of holes; and an open drain, half filled with stagnant filth, in untrapped communication with the sewer; while built up in one part of the court is a large receptacle which at the time of my visit contained accumulations of fish and vegetable refuse. The so-called closets in the court consist of pans set in brickwork, so revoltingly foul as to preclude their being used except for emptying vessels into them.

Granby Place.—All the houses in this court are dilapidated, damp, and fearfully dirty, and exposed to nuisance from accumulations of refuse stored in the court, and from a closet, common to about 14 families, and in a disgusting condition. Drinking water is derived from a tank immediately over this closet. Water was stagnating in puddles on the surface of the court.

Having given these examples of wretched filthiness observed in various quarters of the town, and doubtless in large measure due to the ignorant carelessness of individuals, I think it right to point out that the Sanitary Authority itself must be regarded as largely responsible for the conditions observed. It has been their duty to provide for the detection of nuisances and to enforce the provisions of the Public Health Act for the abatement of nuisances; and if they had done so with any sort of earnestness, it is certain that the conditions about houses now reported would not have been found. The neglect of the Sanitary Authority has reacted on the people themselves. I met with many persons during my inquiry who expressed themselves as ashamed of the conditions under which they were obliged to live, saying they found it impossible to get their houses repaired or limewashed, or the closet defects remedied, and as to opening their windows, if they did so they "got nothing but stink." Some of these people had recently come from the country, and the probability is that in a short time, from association with filth which they are unable to remedy, they will become callous and indifferent to its existence.

Before closing this section of the Report, I should mention that the town possesses a very excellent institution in a public wash-house, where people can go and for a moderate sum be provided with the necessaries for washing, and for an additional small payment have their clothes dried. I went over the establishment, which I am informed is extensively made use of by the poor in the neighbourhood. I should further state that a few houses have recently been built by some philanthropic gentlemen, specially designed to afford improved accommodation to the poor.*

SICKNESS AND MORTALITY.

Having now treated in detail of the sanitary state of Plymouth, it remains to examine the mortality statistics of the district for such evidence as they may give as to the operation of sanitary defects upon health. And first as to the decades 1851–1861 and 1861–1871. The examination of the Registrar-General's death returns goes to show that in both periods the general death-rate of Plymouth was higher than that of the country generally; that the mortality amongst infants and children under five years of age was especially great; notably from diarrhœa and infectious complaints; and that the "fever" mortality was considerable, diminishing indeed in the second decade, but still enough to point to existence of unhealthy excremental conditions. The same state of things has, with certain modifications, gone on to the present time, as will be seen by reference to the subjoined Table abstracted from the Registrar-General's death returns for the last seven and a half years.

TABLE 1.

STATISTICS of MORTALITY obtained in PLYMOUTH during the 7½ years 1871–78. Mean estimated population, 71,216.

Year.	Deaths at all Ages registered as due to											Births.	Deaths of Children under one year of age.
	All causes.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Whooping-cough.	Fever.	Diarrhœa.	Total Zymotics.	Phthisis.	Pneumonia Bronchitis.		
1871	1,636	57	102	26	19	46	40	81	371	No data.		2,173	361
1872	1,534	208	32	9	18	20	50	57	384	,,		2,087	308
1873	1,346	2	8	1	2	34	33	68	148	138	177	2,092	316
1874	1,590	3	125	8	5	57	33	83	314	179	184	2,133	366
1875	1,485	1	1	10	3	48	39	58	160	187	228	2,101	326
1876	1,606	—	100	15	3	18	40	43	219	177	230	2,176	343
1877	1,586	1	3	47	19	31	40	72	213	156	250	2,238	358
6 months Jan.–Jun. } 1878	1,042	—	74	23	12	148	19	15	291	97	192	1,151	243
Total - -	11,825	272	435	139	81	402	294	477	2,100	934	1,261	16,151	2,621
Mean annual rate per 1,000 of the population - -	22·1	·51	·81	·25	·15	·75	·55	·89	3·9	2·38	3·2	30·23	[162·2 per 1,000 births.]

Reference to the above table shows Plymouth to be subject to frequent visitation of epidemic disease. Diphtheria is annually present, and manifests, moreover, a decided increase, the death-rate for the last seven years and a half being 15 per 100,000 against five and seven respectively, for the two decades already referred to. Fever is endemic, and very fatal, but exhibits a decrease in comparison with former years. The phthisis and pneumonia statistics are not complete for the whole period, but embrace only five years and a half; sufficient, however, to show these diseases to have been very prevalent and fatal, and this is instructive when considered together with the high mortality from measles and whooping-cough, diseases which have a marked tendency to lung complications, whereby their fatality is greatly increased.

As to the *distribution of mortality* within the town, I made a careful analysis of the death registers for the last five years and a half, with the result of finding a decided incidence of mortality upon certain streets that are as matter of fact characterised by prevalence of unwholesome conditions in an exaggerated degree. This is quite in keeping with the experience of the parochial medical officers and other medical gentlemen practising largely amongst the poor, who were unanimous in stating that they got a preponderance of sickness in these streets and in their immediate neighbourhoods. In order to enable comparison to be made between the health of these streets and the rest of Plymouth, I selected a few of them, and I instructed persons in whom I could place confidence to obtain for me their respective populations, which, though perhaps not representing the precise mean number of inhabitants for the whole period, may be considered sufficiently proximate to be taken as the basis of the present calculation. The selected streets are all situated in the low-lying portions of the town, and include Exeter Street in the east, and five other streets which I have grouped together as forming part of the western drainage district already referred to as subjected to occasional flooding by sewage.

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* On going over two or three of these houses I observed certain defects in matters of detail, which are important and admit of easy remedy; thus, the sink pipes from the interior of the dwellings are led direct into the soil pipes, and the drinking water was derived from the cistern that flushes the closet.

The populations of the said streets, together with the general and specific mortality obtained therein, are shown in the subjoined tabular statement, together with corresponding particulars for the rest of Plymouth.

TABLE 2.

Registered Deaths during the 5½ years, 1873–78.		Deaths at all Ages registered as due to											Births.	Deaths during 5½ years, 1873–78.
Street.	Population.	All causes.	Small-pox.	Measles.	Scarlatina.	Diphtheria.	Whooping-cough.	"Fever."	Diarrhœa.	Total Mortality from the Zymotic diseases.	Phthisis.	Pneumonia and Bronchitis.		Children under one year of age.
King Street -	1,702	312	—	10	2	2	11	11	20	56	47	74	411	96
Bath Street and Lane - -	437	69	—	6	—	—	2	5	4	17	5	9	101	22
Rendle Street -	536	79	—	4	1	—	6	2	9	22	11	17	97	17
Flora Street and Cottages -	493	66	—	2	4	—	6	2	3	17	7	12	132	17
Granby Street -	457	68	—	4	—	—	3	—	9	16	13	10	75	17
Total of 5 places -	3,625	594	—	26	7	2	28	20	45	128	83	122	816	169
Exeter Street -	1,003	170	—	9	—	2	11	2	12	36	22	12	273	40
Total of 6 places -	4,628	764	—	35	7	4	39	22	57	164	105	134	1,089	209
Mean annual rates per 1,000 in 6 selected streets	—	30·	—	1·37	0·27	0·15	1·5	0·86	2·23	6·4	4·1	5·2		Rate per 1,000 births. 199·9
Plymouth, exclusive of above selected streets	66,588	7,891	7	276	97	40	297	182	282	1,181	829	1,127	10,802	1,743
Mean annual rate, per 1,000 -	—	21·	—	0·75	0·26	0·1	0·8	0·5	0·76	3·2	2·2	3·07		per 1,000 births. 161·1

It will be seen by the above statistics that the general mortality of the given streets amounted to 764 deaths, showing a yearly rate of 30 per 1,000 of the population. Of these 764 deaths, 164, or nearly 22 per cent., are referred to the seven principal zymotic diseases; 105, or nearly 14 per cent., to phthisis; 134, or more than 17 per cent., to pneumonia and bronchitis. Thus, about 53 per cent., or more than one half of the total mortality, is referred to diseases which are more or less preventible. Lastly, the infantile death-rate is nearly 20 per cent. of the births registered.

Again, comparing the annual death-rates obtained in these streets with corresponding rates for the remainder of Plymouth, we find the general death-rate of the streets is 30 per 1,000, against 21 per 1,000 for the rest of Plymouth; also that the total death-rate from the seven principal zymotic diseases is double that from the same causes in Plymouth, being 6·4 against 3·2 per 1,000; while the death-rates from phthisis, and pneumonia and bronchitis, are also considerably in excess, being 4·1 and 5·2 respectively, against 2·2 and 3·07 for the rest of Plymouth. Lastly, the infantile death-rate is 199·9 per 1,000 of the births, against 161·1 per 1,000 for the remainder of Plymouth. The significance of these figures will be better appreciated from consideration of the fact, that had the rates of mortality obtained in the given streets from *all the specified diseases* been equalled by the remainder of Plymouth, the corresponding deaths in the latter would have amounted to 5,806 instead of 3,137; in other words, there would have been an *increase* of 2,669 *deaths.* With reference to the given streets, I would further point out that while the high mortality from *all causes* is undoubtedly attributable to the general unwholesome conditions that prevail, the excessive fatality from "fever" and, perhaps, from diarrhœa, may be regarded as the results specially of excremental nuisances; and in like manner the very high death-rates from diseases of the respiratory organs may be connected more particularly with dampness, overcrowding, and other unwholesome conditions tending to vitiate the atmosphere of the dwellings. It is noteworthy that scarlatina and its allied disease diphtheria are the only diseases in respect of which the given streets do not compare very unfavourably with the rest of Plymouth.

With regard to the *visitations of epidemic disease* to which Plymouth is subject, it may be premised that the character and circumstances of the town are such as expose it in a peculiar degree to the introduction of dangerous infectious disease, forming as it does a great naval and military centre, also being an important market town, and one of the chief sea ports whence numerous emigrants annually embark; circumstances which combine to invite continual influx of visitors and strangers from all parts, rendering the town liable to importations of disease. And it may be presumed that some special risk is run through the arrival in the port of vessels having infectious disease on board; but this probably does not count for much. Again, should any infectious disease appear amongst the emigrants at the depôt awaiting embarkation, such cases are at once sent off to "lodgings," with the exception of small-pox and "fever" cases, which are said to be removed to hospital. To mention a case in point that happened during the present inquiry, a child attacked with scarlatina at the depôt was, together with her family removed to the said lodgings, where they remained from the Sunday to the Tuesday, thereby affording ample opportunity of communicating infection to others. The lodgings, it should be stated, are situated in a crowded part of the town, and partake of the character of a common lodging house.

The epidemic of whooping-cough, which has added exceptionally to the mortality of the present year, may be considered to date from September 1877, when two deaths were registered from this cause. From this date the disease gradually increased till the following February, when it reached its highest fatality, causing 39 deaths. It continued very fatal throughout March, but afterwards gradually declined, and terminated in June, resulting in all in 178 deaths, of which 67 per cent. occurred in children under two years of age. The epidemic was fatal to females to the extent of one fourth more than to males.

The disease was chiefly confined to the poorer class, and its spread would appear to have been due, as usual, to the unrestricted communication that obtained between the infected and healthy children of careless people. The special intensity of the recent epidemic has no doubt been related to the comparative immunity of the town for some time previously from the disease. For two and a quarter years (from June 1875 to September 1877) Plymouth had had little whooping-cough, only 27 deaths having been registered in the whole of that period. Hence, in all probability, there were more susceptible children on the occasion of the disease resuming epidemic proportions. According to the testimony of the medical men the deaths bore a high proportion to the number of attacks. I have failed to connect this fatality with meteorology, but inquiry goes to prove that it was influenced by the unwholesome atmospheric conditions under which the patients had been placed. Doubtless the mortality ascribed to whooping cough might in part be put to the account of measles, which was epidemically coexisting. In this connection it is noteworthy that bronchitis and pneumonia, diseases of the respiratory organs, were very generally the immediate cause of death.

With regard to *typhoid fever:* This disease is so closely associated with excremental nuisances as to have obtained for it, *par excellence*, the very pertinent title of "the filth disease;" and there is abundant evidence to prove that its persistent presence in Plymouth is due to such unwholesome conditions. Besides the evidence to that effect arising out of the experience of Dr. Littleton, the Medical Officer of Health, as expressed in his report to the Sanitary Authority (to be presently referred to), I may illustrate this position by similar experiences obtained in respect of certain cases of typhoid fever that came under my own observation:—

(1.) A house in Cobourg Street, inhabited by a widow, two daughters, and a son. While one of the daughters was ill of typhoid fever, I visited the house and learned that the family had lived there about 10 years, during which time they had been more or less out of health, suffering from headache, nausea, and other ailments, the widow stating that they always felt better after being away from home for a few days, but soon relapsed into the same state on coming back. She further informed me this was the second time her daughter had suffered from typhoid fever, having had it about five years before, when her other daughter and a nephew then staying with them were also attacked. The illness was then attributed to bad drainage, and examination was instituted, with the result that the house drain was found defective and was partly relaid; but instead of the work being properly done, the pipes were laid in such a fashion that from that time the sitting room, which is partly below the surface, has been pervaded by an offensive smell proceeding from the inlet situated in the area, and to this cause the widow ascribed the continual illness of herself and family. I had the flagstones of the area taken up, when a deposit of black mud was found to intervene between the drain inlet and the end of the house drain. The inlet was trapped, but a hole by the side of it freely allowed the escape of foul air from the sewer, occasioning the smell complained of. In addition to this danger, the drinking water was derived from the cistern which flushed the indoor closet, and the overflow pipe was in direct communication with the D trap of the water-closet. The closet in the yard was untrapped and unprovided with means of flushing. Thus there was abundant evidence in this case of excremental pollution of air and water, and there could be no doubt of the relation of these conditions to the long continued sickness and recurring attacks of typhoid fever.

(2.) A house in Union Street, inhabited by three families, consisting of five adults and six children, one of whom was suffering from typhoid fever, and was the occasion of my visit to the house. The history of this household, as in the instance above related, told of long-continued sickness with occasional outbreaks of typhoid fever, two cases occurring in 1876 and four in 1877. The sitting-room on the ground floor was reported to be always pervaded by a horrible smell proceeding from the adjoining pantry, people stating that on entering the room in the morning, after the house had been shut up, the stench was abominable. Observing that the soil pipe from the closet above was carried down the pantry wall, I had the floor taken up in order to trace the connexion with the drain, when a quantity of stinking black mud was disclosed lying in a kind of rough channel extending from the foot of the closet pipe to the pipe-drain leading to the sewer, a piece of slate being merely placed at the bottom of the down pipe to shoot the discharge into the rude channel. There was direct air communication between this portion of the drain and the pantry, by means of rat holes. Moreover the waste-water pipe from the sink in the pantry was led direct into the drain pipe, and had had to be stopped up in order to prevent the escape of stinking air up it into the pantry. Here again the drinking water was derived from the closet cistern. With regard to the child now suffering from fever, his mother told me he was generally down first in the morning, and employed in the sitting-room learning his lessons. Thus he was peculiarly exposed to the danger of respiring the polluted atmosphere after it had been for many hours stagnant.

(3.) A house in King Street, visited in consequence of a case of typhoid fever. Here the chief element of danger consisted in a closet situated near the kitchen and having no opening to the external air. At times the closet was reported to be very offensive.

(4.) Octagon cottages, situated in a close court, at the end of which are two foul closets which discharge into an open catchpit having an overflow pipe to the sewer. At the time of my visit the stink from the pit was unbearable, and no fresh air got into the court to dilute or disperse the pollution. Here children of four or five families were successively attacked with typhoid fever, the last sufferer being a little girl whom I saw a few days after she was confined to her bed. In all these cases the infected evacuations were thrown into the catchpit, there decomposing and causing specific contamination of the atmosphere, resulting doubtless in the successive attacks of typhoid fever above referred to, and probably also in some three or four cases of very severe diarrhœa which occurred at the same time in one of the cottages adjoining the closets.

I also visited a house in Bath Street where typhoid fever was present and fatal last autumn. Here I found the floor of the cellar flooded with the contents of a drain and inches deep with mud, which had been allowed to remain unremedied since last year.

No. 5, Cambridge Lane affords another example of typhoid fever and continued sickness in connexion with sewer air emanating from an old drain under the sitting-room. The crevices of the floor of the room were stuffed with paper in the vain hope of excluding the smell, and I was informed that in consequence of the nuisance a new drain had been laid down, but the old one had been left intact and the evil continued unabated.

Besides the above-mentioned cases which came under my own observation, Mr. Greenway, deputy medical officer of health, told me of several cases of typhoid fever that occurred in the Old Sailor's Home, Vauxhall Street, shortly prior to my visit, and which he ascribed to an unwholesome closet, since removed, represented to me as built up in the centre of the interior of the building, like a sentry box, and having no opening to the external air and no arrangements for flushing. About the same time a case of typhoid fever appeared in a house behind the Sailor's Home. I visited the said house and found it stinking abominably; the closet indoors had no means of flushing, and two other closets in the yard, situated within a few feet of the lately infected room, were in a filthy condition, while immediately over them was a cistern which supplied the drinking water.

Again, at Portland Villas, a servant girl was attacked with typhoid fever, considered by the physician in attendance to be due to exposure to sewer air introduced into the kitchen by means of an untrapped sink pipe in communication with a very defective old drain.

The above examples are illustrative of the habitual association between typhoid fever and polluted air and water, while the instances in which such pollution co-existed with sickness and recurring cases of typhoid fever for a series of years have a special force of their own.

Former greater prevalence of "fever."

But in the face of the persistent prevalence of typhoid fever in this town, it is important and satisfactory to observe, as already intimated, a steady decline in the mortality from this disease compared with former years, the fever death-rate for the last seven years and a half averaging ·55 per 1,000 living, against ·86 and ·91 per 1,000 for the two decades 1861–'71 and 1851–1861 respectively.*

This fact assumes significance when considered in connexion with certain sanitary improvements effected during recent years. Thus,—

(1.) The water supply on the continuous system has been extended to the whole town. The necessary works were commenced in 1869 and completed in 1874, and during the same period care was taken to sever the connexion which formerly existed between waterclosets and water mains.

(2.) Certain of the closets which were productive of intolerable nuisance from being in direct communication with the sewers and otherwise have been properly trapped, fitted with pans, and provided with service cisterns.

With regard to these measures it is instructive and interesting to observe that whereas in other towns where communication between waterclosets and water mains existed, experience has shown severe epidemics of typhoid fever to have resulted from the drinking water becoming contaminated by air from the closets or sewers gaining entrance into the water mains, here, on the other hand, the severance of such connexion was attended with marked diminution in the mortality from fever. Thus the evidence goes to prove that the measures taken by the Sanitary Authority for the protection of the general water supply of the town from excremental pollution have resulted in considerable diminution of the fever mortality, and there can be no reasonable doubt that if similar protection were extended to the drinking water of individual households as well as to the atmosphere of the dwellings a further reduction might be anticipated, possibly to the extirpation of typhoid fever from the town.

Sanitary Administration.

Hospital accommodation and disease prevention.

As to disease prevention.—The Sanitary Authority possess an infectious disease hospital, but, as stated in my former Reports to the Board dated February 1877 and February 1878, the building is ill adapted to the purpose. It is situated in the workhouse grounds, and was erected originally by the Sanitary Authority for the reception of cases of small-pox during the epidemic of 1872. The accommodation consists of two wards, one measuring 30 × 19 × 11 feet, and containing 10 beds, thus allowing 620 cubic feet per bed, in lieu of 2,000 feet as recommended by the best authorities; the other measuring 21·3 × 19 × 11 feet, and containing nine beds. The larger ward is lighted by four windows, which do not open, the provision for ventilation consisting in an opening 12 × 6 inches placed under each window, and two ventilators in the ceiling. The smaller ward is lighted by two windows not made to open, and the ventilation is effected by means of a hole under each window, and one ventilator in the ceiling. Thus it will be seen that the building is faulty in construction, and the cubic capacity of the wards inadequate to the number of beds allotted, while its position in the workhouse grounds is *per se* an obstacle to its success, it being highly desirable that such institutions should in no way savour of parochial relief as tending to prejudice the independent poor against them, and so frustrate the end for which they were designed.

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* With this reduction in the fever death-rate may be noted also a diminution during the last seven years and a half in the mortality from diarrhœa, as well as in the infantile mortality to which diarrhœa usually contributes so largely.

Some 18 months ago the authority recognised the necessity of providing a new hospital, and applied to the Local Government Board for a loan, and for powers to purchase the necessary land. At this time, conjointly with Mr. S. J. Smith, I was instructed to inspect and report upon the proposed site, with the result that we found it well adapted to the purpose, and reported accordingly. Since then, notwithstanding frequent letters from the Local Government Board pressing upon the attention of the Sanitary Authority the desirability of proceeding with the building, the matter up to the present time has been allowed to remain in abeyance, the Sanitary Authority alleging as a reason that they have in contemplation the purchasing of the South Devon and Cornwall Hospital, when that building shall be vacated in favour of a new hospital which the governors propose to erect. But here it should be stated that one of the reasons assigned by the governors for erecting a new hospital is that the sanitary condition of the present building is considered unsatisfactory. And one of the medical staff, who courteously showed me over the hospital, mentioned that erysipelas is not an infrequent attendant on operations and other wounds, which circumstance alone tends to throw grave suspicion upon its sanitary state. Further, as militating against its fitness, I note that one ward is considerably below the surface of the ground, and, from the construction of the building generally, efficient cross ventilation cannot be secured except in one or two of the wards. Taking these facts into consideration, it would seem highly inexpedient that the Sanitary Authority should entertain the idea of purchasing it for an infectious disease hospital. I would strongly advise them to no longer delay, but at once to proceed to erect a hospital on the site already approved.

The inefficiency of the *present infectious hospital* has not been confined to the building itself, but has extended to the administration. Thus, during the epidemic of small-pox above referred to, the hospital was crowded by extra beds being made up on the floors. Now small-pox cases especially require abundance of space with thorough ventilation, conditions which were denied to these poor patients, and the result was a danger to themselves as well as to others frequenting the overcrowded wards. Moreover, I am credibly informed that due restriction was not placed on the visits of friends from outside.

Since the epidemic of small-pox in 1872, casual cases of infectious disease have continued to be from time to time received into the hospital, including recently a case of small-pox which was landed from a vessel, and placed in the nurse's room at one extremity of the hospital. Shortly afterwards a patient suffering from typhoid fever was also taken in, together with his family, from the emigration depôt, and all located together in the ward at the opposite extremity, thus separating the two diseases as far as the building would admit, but still separating them very imperfectly, especially as the same nurse was in attendance upon both diseases. Up to the time of leaving the hospital the family had, it is true, shown no symptoms of small-pox, but not the less did they run a risk that ought to have been avoided. From one cause or another little use has been made of the hospital in the way of timely removal to it of cases of infectious disease occurring where they could not be properly isolated in their own homes. The want of action in this direction was indicated in the epidemic of diphtheria which formed the subject of inquiry at the commencement of this year, when the only measures adopted to prevent the spread of the disease were confined to such instructions as were practicable under the difficult conditions of the patients' home. And again, during the course of the present inquiry a case of scarlatina occurred in a family consisting of five or six individuals occupying one room, but when brought under the notice of the town clerk, he decided that it was not a case for admission to hospital. This was because the father of the sufferer was above pauperism, and yet was not possessed of sufficient means to enable him to pay 10*s.* or 12*s.* per week for the maintenance of his child in hospital. Now this, I would suggest, was clearly a typical instance where admission to hospital might have availed to avert evil consequences to the public, seeing that each member of this family would be liable to communicate infection to others, the disease in this way becoming widespread and epidemic. The Legislature, it may be observed, have recognised the importance and true economy of preventing the spread of disease by authorising hospitals to be built for the purpose; but in order to the successful working of the system, it is essential that the Authority should hold out every inducement to the public to make free use of such institutions, instead of making the charge of admission so high as practically to preclude the poor from availing themselves of the advantages they offer.

With regard to other precautionary measures to prevent the spread of disease, the Authority do not possess either a mortuary or a disinfecting chamber, although they have frequently been advised by the Medical Officer of Health as to the importance of such provision, and as to the best means of carrying out the necessary arrangements for disinfection. The same inaction has been manifested in the neglect to exercise such supervision and control as would have prevented the promiscuous mingling together of the infected and healthy in schools and elsewhere; while with regard to the introduction of infectious disease into the town there has been great want of anticipatory measures in the way of such arrangements with the Emigration Authority as would insure cases of dangerous infectious disease, occurring amongst the emigrants, being sent to hospital instead of removed to lodgings as hitherto has been the custom.

Sanitary administration.

In 1874 Dr. Littleton was appointed Medical Officer of Health upon a salary of 50*l.* per annum, increased in the following year to 100*l.* So far from the Authority being desirous that this officer should afford them the full benefit of his services in keeping them informed as to the actual condition of the district, and advising them as to the measures necessary to be adopted for the improvement of the public health, they have preferred to make themselves the judges of what was medically needful for the health of the town. Thus, Dr. Littleton for some time after his appointment was in the habit of frequently submitting to the Authority written Reports directing their attention to the existence of various conditions prejudicial to health, until informed by them that unless specially called upon to do so, he was not required to send in written reports, but instead to attend the meetings of the sanitary committee, and afford any information required of him. He has on repeated occasions reported the occurrence of cases of typhoid fever as being due to sewer air gaining entrance to the dwellings, as will appear from the following extract from his report dated Feb. 1878. He had been requested by the Sanitary Committee to furnish them with a written report expressive of his opinion as to whether the defective ventilation of the sewers was to be regarded as a cause of sickness, and excessive mortality in the district. Dr. Littleton writes: "That the mortality is at present excessive is true, but the question as to " what causes the present excess is due demands a more general inquiry into *all* the " ascertained causes in producing the said excess, and *not alone* into the *particular* " *cause* to which the Committee has directed the Medical Officer of Health's attention." Further on, Dr. Littleton goes on to say: "The salient point in this Report, and in " several former written Reports to your Committee, December 28th, 1874, March 9th, " 1875, March 27, 1877, and at other times, is the general prevalence of typhoid " fever over the higher situated and better class of houses, as well as in the lower " levels of the town. The searching investigations which have been made into the " greater number of these cases have resulted in a confirmation of the views generally " entertained by the Sanitary Medical Officers throughout the kingdom, that they are " due to defects in the drainage, either within the private residences, and the inadequate connexion of the drains with the public sewers, or to defects in the general " drainage, including insufficient ventilation of both public and private drains. The " defects in the ventilation of the public sewers have been demonstrated in the cases " of typhoid fever which occurred at the Female Orphan Asylum, at the top of Lockyer " Street; these cases I have *several times* brought to the *notice of the Committee* as in " themselves a very complete proof of the condition of the air within the public sewers, " the unfortunate cases in themselves furnishing a crucial experiment as to the " emanations from the public sewers which find a too ready entrance into the interior

" of the dwellings in Plymouth.* There are numerous other cases which have no " other explanation."

In November 1875 the Sanitary Authority, after repeated solicitation on the part of the Medical Officer of Health, made arrangements for his being supplied with the weekly returns of death, but they have taken no steps to insure his receiving information on the appearance of any dangerous infectious disease amongst the pauper class.

Mr. Clegg was appointed Inspector of Nuisances in 1877, since which date a complaint book has been kept in the Guildhall, but no such book had been kept for many years previously. This officer has evidently been very zealous in the discharge of his duties, and has been successful in getting certain nuisances remedied, but much of his time, which migh otherwise have been employed to advantage in inspecting the district, has been taken up in looking after the contractor's men engaged in the removal of refuse. I would remark that I do not think it practicable for any one man unaided to perform efficiently the duties of Inspector of Nuisances in this large town, particularly under present circumstances of general prevalence of unwholesome conditions.

It has been stated in this Report that the Sanitary Authority have recently consulted an engineer with a view to providing efficient ventilation of the sewers; also that certain measures connected with the improved system of the water supply, including the severance of connexion between waterclosets and water mains have been attended with beneficial results to the public health. But beyond this, the sanitary conditions and circumstances of the town of Plymouth, as revealed by my recent inspection, and fully set forth in this Report, are conclusive evidence of the want of efficient sanitary administration, and of the failure on the part of the Sanitary Authority to recognise or appreciate the responsible duties imposed upon them by the Legislature. Thus, the various provisions of the Public Health Act, 1875, designed to secure to the people wholesome dwellings, efficient sewerage and drainage, and freedom from excremental, refuse, and other nuisances, have been flagrantly disregarded. The byelaws relating to the proper keeping of slaughter-houses and lodging-houses have been suffered to be grossly infringed, and no action has been taken under the Bakehouse Regulation Act, or the Sale of Food and Drugs Act.

In conclusion, I cannot too earnestly impress upon the Sanitary Authority the grave responsibility which devolves upon them to undertake comprehensive measures for the remedying of the several sanitary evils which the burden of this Report goes to prove have materially contributed to the sickness and mortality which have characterised this town.

F. H. BLAXALL.

28*th September* 1878.

Recommendations.

(1.) *As to Sewerage.*—Efficient sewerage should be provided for all inhabited parts of the district. Every opportunity should be taken to abolish cesspits and to compel houses to drain into the sewers. With regard to those portions of the district likely to be built over, it is highly important the sanitary authority should devise some comprehensive scheme of sewerage, and houses as they are built should be required to fit in with such scheme, thereby providing against the perpetuation of cesspits. The contemplated ventilation of the sewers should be carried into effect with as little delay as possible, care being taken as to the proper placing of ventilators that they may not be productive of nuisance. Provision should also be made for flushing the sewers. It is highly important that, subject to the advice of a skilled engineer, means should be devised whereby the nuisance now resulting from the discharge of sewage into the outer basin of the Mill-bay Docks shall be obviated, and the flooding by sewage of the houses in the lower level of the town prevented. The northern sewer should no longer be permitted to discharge into the watercourse, but the sewage should be disposed of in a manner not to produce nuisance. The sewage nuisance near the Mutley Plain station should be remedied. The contents of the intercepting catchpits in Treville Street and other streets should be thoroughly deodorised by the free application of some disinfectant before being disturbed, and the process of clearing out the catchpits should be carried out as expeditiously as possible, the filth being carted away as soon as brought to the surface. Old defective drains should be replaced by new ones, and disused drains productive of nuisance should be traced out and filled in. The authority in all cases should exercise vigilant supervision to insure the sewers and drains being properly laid, and the connexion of house drains with sewers, and of closet pipes with drains, properly established; and where reason exists to suspect such connexion to be imperfectly effected, or the gradient of sewers or drains to be faulty, examination should be instituted, and if found to be the case the evil should immediately be remedied. All drain inlets in the vicinity of dwellings should be properly trapped. Sink and waste-water pipes from the interior of dwellings should not be permitted direct entrance into the drains, but should be led outside the house and cut off over trapped inlets of drains.

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* In the cases referred to there was evidence of exposure to the danger of respiring air polluted by emanations from the drains, whereas in the remainder of the inmates of the asylum there was no such exposure, and they all escaped.

(2.) *As to Water Supply.*—It is desirable for the better protection of the water supply that it should be conveyed in iron pipes in its course above Knackers Knowle, instead of running in the open leat as at present; also that efficient filtering beds and a storage reservoir should be provided. For the improvement of the water circulation the dead-ends should as far as practicable be done away with. The old wooden cisterns should be abolished; all water tanks should be protected by covers and kept scrupulously clean. In no instance should drinking water be derived from the water-closet cistern.

(3.) *As to Excrement removal, &c.*—The closet accommodation should be increased to meet the requirements of the people, the Sanitary Authority exercising due supervision to insure all closets being kept in repair and in a clean and wholesome condition, having special reference to closets in close relation to dwellings, care being taken where house and closet adjoin that the partition wall is in thorough repair. All closets should be provided with service cisterns for flushing purposes. Closets situated indoors should be in communication with the external air, and their soil pipes efficiently ventilated.

(4.) *As to Refuse removal.*—Houses should be provided with properly covered receptacles for refuse, and arrangements should be made to insure early and systematic removal of all refuse from the vicinity of dwellings, which should be effected in covered carts so as not to produce a nuisance. The amount of refuse at present accumulated at the depôt should be considerably reduced.

(5.) *As to Streets.*—Measures should be adopted to prevent the emptying of slop and waste water into the streets. All streets should be kept in thorough repair, and those newly opened for traffic should be properly channelled and levelled.

(6.) *As to the keeping of Animals.*—No animals should be allowed to be kept in a manner to produce nuisance, but scrupulous care and attention to cleanliness should be observed where animals are kept in the vicinity of dwellings. Manure should not be suffered to accumulate in the vicinity of dwellings, and the exposure of stable litter in the streets to dry should be prohibited.

(7.) *As to Slaughter-houses.*—Slaughter-houses in unwholesome relation to dwellings should so far as possible be abolished, and the blood and offal from all slaughter-houses should be duly removed. The provisions of the byelaws having reference to the subject should be strictly enforced. The public slaughter-houses should be placed under efficient management and the private slaughter-houses systematically inspected.

(8.) *As to Lodging-houses.*—It is desirable that the common lodging-houses should be inspected by the Medical Officer of Health, with a view to ascertain how far they fulfil the requirements contained in the Memorandum to the Model Byelaws with regard to conditions of wholesomeness, cubic capacity, &c. Subsequent to such inspection the said houses should be placed under efficient supervision, and their condition regularly reported to the Sanitary Authority. The better byelaws relating to them should be enforced.

(9.) *As to Dwellings and their Precincts.*—Yards and curtilages which are imperfectly paved, and dirty, also dwellings which are in an unwholesome condition through want of lime-washing, defective ventilation, dampness, dilapidation, or other causes, should be dealt with under the Public Health Act, 1875, sections 46 and 91. The Sanitary Authority should apply for powers under the Artizans and Labourers Dwellings Improvement Act, 1875, to enable them to deal with such of the areas as contain dwellings thickly crowded together, and in an unwholesome condition.

(10.) The Medical Officer of Health and the Inspector of Nuisances should be instructed to make a thorough and systematic inspection of the district, and to report the results thereof to the Sanitary Authority, in order that, being made acquainted with the situation, extent, and nature of the various sanitary evils that specially affect certain parts of their district, they may be in a position to adopt suitable and comprehensive measures to remedy the same.

(11.) The building of the proposed infectious hospital on the site already approved should be proceeded with forthwith. A mortuary and a disinfecting chamber should be provided, and the provisions of the Public Health Act, 1875, having reference to the disinfecting of dwellings and things, the exposure of infected persons and things, and the letting of infected dwellings, should be enforced.

(12.) The Medical Officer of Health should receive such remuneration as would place the Authority in a position to require of him an efficient discharge of the important duties attaching to his office, and arrangements should be made to insure his receiving information on the occurrence of cases of dangerous infectious disease in the pauper class, in order that measures may be promptly taken to secure the due isolation of such cases.

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